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Factsheet

Feeding and Managing Replacement Beef Heifers

(Revision of Factsheet, "Feeding and Managing Replacement Heifers", January 1974)

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One of the major challenges facing many beef producers is the development of replacement heifers for the breeding herd. Research has shown that the lifetime productivity of beef females can be increased by calving heifers at two years of age. This goal can be achieved by producers willing to provide the required nutrition and management to the growing replacement heifer.

Age at First Calving

Producers should aim to calve their replacement heifers by two years of age. This practice will improve the profitability of the beef operation by offsetting the high costs of feed, labour and investment in raising replacements. To produce the maximum pounds of calves in her lifetime, a cow must calve each year starting as a two-year-old. Research from Oklahoma shows that this is indeed true – heifers calving at two years of age produced an extra 330 pounds of calf on a lifetime basis over heifers calving at three years of age.

Nutrition and Development of Replacement Heifers

Optimum reproductive performance and lifetime productivity of a cow are clearly tied to proper nutritional management of replacement heifers during growth and development of structure and reproductive function.

For heifers to reach puberty at 14-15 months of age, they must be adequately grown, but not overconditioned. Three factors associated with puberty in the replacement heifer are weight, age and breed. Weight is thought to be the major determining factor affecting puberty in heifers at 14-15 months of age. Larger, later maturing breeds reach puberty at an older age.

Producers, who have the most control over weight gain in their cattle, should establish target weights at which heifers are to be bred and develop a feeding program to allow heifers to reach that goal in good condition. Target weight will vary with each breed.

Replacement beef heifers should attain 65 to 70% of their potential mature weight by the time they are bred at 14-15 months of age. This would mean that heifers should gain an average of 1.25 to 1.75 lb. per day from weaning to first breeding or 250 to 350 lbs. during the first winter (depending on breed). For most breeds and crosses, heifers should weigh from 650 to 850 lbs. at breeding time.

Conception rates in heifers will vary depending on how well they have been grown. If heifers are to be good lifetime producers they must calve early. To achieve this they must show heat and conceive early in the breeding season.

Table 2. Time of First Heat on 2 Levels of Feed

	Percent in heat, month 12 to 16				
Feed Level	**12**	**13**	**14**	**15**	**16**
Low: 0.8 lb. gain/day					
– Angus	0	0	33	82	90
– Hereford	11	22	33	38	50
– Crossbreed	0	12	68	85	100
High: 1.6 lb. gain/day					
– Angus	30	58	100	100	100
– Hereford	12	50	100	100	100
– Crossbreed	18	76	94	94	100

Ref: Hemstad – Manitoba

Mismanagement through over or under feeding during the critical phases will adversely affect lifetime productivity. Energy intake beyond needs for structural and muscular growth in heifers may cause problems regarding their potential of milk production (e.g. creep feeding). Research has shown that negative relationships between maximum probable producing ability of dams and milk production in offspring do exist.

Table 1. Weight at Which 14-15 Month Old Heifers Reach Puberty

Percent of Heifers in Heat	Angus	Hereford	Char.	Angus X Hereford	Simm. X British	Lim. X British
50	550	600	700	550	650	650
65-70	600	650	725	600	700	700
85-90	650	700	750	650	750	750

Ref: K. Lusby

The basis of the problem is the infiltration of fat into the udder which may later restrict future milk producing ability of these heifers as cows. Therefore, when selecting and feeding for milk production, the optimal level rather than maximal level must be the target to avoid impairing production of replacement heifers.

Figure 1. Yearling heifers well grown and cycling at 14-15 months

Daily Nutrient Requirements for Replacement Heifers (growing at 1.25 lb/day)*

Table 3. Medium Frame Heifers

Body Weight	Minimum Dry Matter Intake	Total Protein	TDN	Calcium	Phos.	Mag-nesium	Potassium	Salt	Vit. A
(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(KIU)
400	10.03	1.08	6.65	.0425	.0229	.0151	.0652	.0251	10.04
500	11.86	1.16	7.86	.0425	.0252	.0178	.0771	.0297	11.86
600	13.60	1.24	9.01	.0425	.0275	.0204	.0884	.0340	13.6

Table 4. Large Frame Heifers

Body Weight	Minimum Dry Matter Intake	Total Protein	TDN	Calcium	Phos.	Mag-nesium	Potassium	Salt	Vit. A
(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(KIU)
500	12.75	1.24	7.82	.0447	.0259	.0191	.0829	.0319	12.75
600	14.61	1.33	8.97	.0451	.0284	.0219	.0950	.0365	14.62
700	16.41	1.41	10.07	.0457	.0308	.0246	.1066	.0410	16.41

**OMAF adapted from 1984 NRC (BRFP 1991)*

Possible Daily Rations for a 500 lb. Growing Heifer (medium frame – 1.25 lb. gain/day)

Ration 1 8.5 lb. good quality legume hay (18% CP)
4.0 lb. grain corn **or** 4.5 lb. mixed grain

Ration 2 9.0 lb. medium quality mixed hay (12.2% CP)
4.5 lb. grain corn

Ration 3 8.5 lb. grass hay (9.7% CP)
4.5 lb. grain corn
.5 lb. 40% supplement

Ration 4 19.0 lb. corn silage (8% CP)
4.0 lb. grain corn **or** 4.5 lb. mixed grain
1.0 lb. 40% supplement

Ration 5 18.0 lb. haylage (15.8% CP)
4.0 lb. grain corn **or** 4.5 mixed grain

Note: Monitor body condition, especially with medium frame heifers and make adjustments to the feeding program if required (e.g. less grain)

Possible Daily Rations for a 500 lb. Growing Heifer (large frame – 1.25 lb. gain/day)

Ration 1 9.5 lb. good quality legume hay (18% CP)
4.0 lb. grain corn **or** 4.0 lb. mixed grain

Ration 2 9.5 lb. mixed hay (12.2% CP)
4.0 lb. grain corn **or** 4.5 lb. mixed grain

Ration 3 8.0 lb. grass hay (9.7% CP)
4.5 lb. grain corn **or** 5.0 mixed grain
1.0 lb. 40% protein supplement

Ration 4 33.0 lb. corn silage (8% CP)
1.0 lb. 40% protein supplement

Ration 5 18.5 lb. haylage (15.8% CP)
4.0 lb. grain corn **or** 4.5 mixed grain

Feed Analysis and Ration Formulation

Feed analysis of home grown feeds provides the necessary information to properly formulate rations to meet the nutritional needs of the growing replacement heifer. Assistance with ration formulation is available from all OMAF agricultural offices, feed companies, etc.

Mineral and Vitamin Requirements

With accurate feed analysis and the use of a ration formulation program excesses or deficiencies can be identified in the mineral and vitamin area. Decisions regarding appropriate mineral application can be made more precisely. Mineral and vitamin requirements have to be met to ensure adequate growth and fertility. Commercial mineral mixes can either be fed on a free choice basis or mixed with the ration.
(Ref. Factsheet, *Minerals for Beef Cattle*, Order No. 73-095)

Monitor Growth

Monitoring growth with periodic weighing will tell how well heifers are growing on specific rations. Thin or overconditioned heifers should be avoided. Visual appraisal of heifer body condition can also be important in making adjustments to the feeding program. As mentioned earlier research has indicated that overconditioning replacements heifers can impair future milking ability and if continued could also result in increased calving difficulty.

Table 5. BHIP Yearling Heifer Performance

Year	Number of Heifers	Average Adjusted Yearling Weight (lb)
1986	20,310	742
1987	22,561	754
1988	23,000	778
1989	10,926	824
1990	11,078	786

Breeding Replacement Heifers

Replacement beef heifers should be bred three weeks prior to the breeding of the mature cow herd since heifers require a longer period of time to begin cycling and show heat after calving than mature females. Heifers bred before the main cow herd, will calve earlier in the season and should be cycling normally by the time the main cow herd is being bred the following year, provided adequate nutrition and management are in place. If heifers are to be good lifetime producers, they must show heat and conceive early in the breeding season. A breeding season of forty-five days should be adequate for well grown heifers. Pregnancy check heifers and cull those that are open.

The Pregnant Yearling

The pregnant yearling heifer should continue to gain during her second winter at a rate of approximately one pound per day up to calving. At this point in time the heifer needs additional nutrients to meet her own needs, for continued growth, as well as, for gestation. These pregnant growing heifers must be handled as a separate management group.

Daily nutrient requirements of bred yearling heifers are shown in table 6.

Possible Daily Rations for a Bred Yearling Heifer (900 lb. ADG .9 lb.)

Ration 1 20 lb. legume hay (18% CP)

Ration 2 18 lb. mixed hay (12.20% CP)
2 lb.grain corn **or** mixed grain

Ration 3 26 lb. corn silage (8% CP)
9 lb. legume hay (18% CP)

Ration 4 39.5 lb. mixed haylage (15.8% CP)

Calving Management

The two main problems facing cow-calf operators in breeding replacement heifers to calve at two years of age are greater difficulty at calving and poor conception rate after calving.

More two-year-old heifers require assistance at the first calving than three-year-olds. In most cases 20 to 30% of two-year-old first calf heifers will require assistance. A recent Benchmark Study conducted by Ontario Veterinary College showed that an average of 22% of first calf two-year-olds required assistance. It is important then that these first calf heifers be managed and fed separately to ensure that they do not become over or under conditioned and that calving be monitored more closely in order that assistance can be provided if and when necessary.

Feed restriction during the latter stages of pregnancy is not a wise approach to managing first calf heifers. Research has shown that feeding below recommended levels will only slightly reduce the birth weight of calves, unless a severe restriction in energy is imposed. However, this does not necessarily reduce calving difficulty because reduced energy intake reduces the size of the heifer herself. Specifically the pelvic opening is reduced in underfed heifers and no reduction in calving difficulty is observed. Underfeeding heifers does result in heifers weak at the time of calving, lower calf survival rates, less milk for calf growth and rebreeding is more difficult. Overfeeding, in late pregnancy causing heifers to become overly fat, is associated with increased calving difficulty and should be avoided.

Table 6. Daily Nutrient Requirements of Bred Yearling Heifers (Last 1/3 pregnancy)

Body Weight	ADG	Dry Matter	TDN	Total Protein	Calcium	Phos.	Mag-nesium	Potas-sium	Salt	Vit. A
(lb.)		(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(KIU)
800	.9	16.30	9.66	1.77	.0486	.0348	.0265	.1235	.0441	22.89
900	.9	17.75	10.40	1.90	.0509	.0394	.0289	.1345	.0483	24.99
1000	.9	19.11	11.24	2.03	.0555	.0417	.0310	.1448	.0515	26.88
1100	.9	20.47	12.08	2.15	.0602	.0463	.0333	.1551	.0557	28.77

Preventing Calving Difficulty (Dystocia)

Calving difficulty in two-year-old heifers is caused by undersized heifers or oversized calves. These are not one in the same. Birth weight is controlled mainly by genetics and is considered to be the primary cause of calving difficulty. This trait is highly heritable and has a significant correlation with calving difficulty which reinforces the need for the recording of accurate birth weights of breeding animals in order to help reduce the incidence of dystocia. Proper development and growth of replacement beef heifers is in the control of cattle producers.

Considerations for minimizing calving difficulty:

1. Mate yearling heifers to low risk bulls;
   (a) A proven bull for calving ease
   (b) A moderate to low birth weight bull of her own breed
2. Feed pregnant heifers adequately: do not underfeed or overfeed.
3. Give first-calf 2-year-old heifers extra attention at calving time.
4. Know when and how to give assistance and when to consult a veterinarian.
5. Within a herd, select replacements from among the larger (older and growthier) heifers.
6. For long term progress in a herd, select sires having above average EPDs for maternal calving ease.
7. Possible use of pelvimetry to cull replacement heifers with extremely small pelvises.

Calving problems in two-year-old heifers are very common. Permanent solutions to the problem demand long range breeding and management goals for the future of the breeding herd. Calving ease should be a priority for all.

Feeding Lactating First Calf Heifers

The second major problem associated with calving two-year-olds is failure to conceive. Lactation is a much more severe strain than gestation on the young female. Normal body development is retarded, at least temporarily and some heifers may be permanently stunted unless proper nutrition is provided.

The heifers' nutrient requirements are greatest during this period because she must maintain her body, nurse a calf, recover from calving, cycle, rebreed and continue to grow. If adequate nutrition is not provided this two-year-old heifer may fail to rebreed.

The daily nutrient requirements of a nursing heifer are indicated in table 7.

Table 7. Daily Nutrient Requirements of the First Calf Heifer (condition score 3, ADG .75, nursing a calf)

Body Weight	Dry Matter	TDN	Total Protein	Calcium	Phos.	Mag-nesium	Potas-sium	Salt	Vit. A
(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(lb.)	(KIU)
800	18.9	13.24	2.04	.0640	.0450	.0284	.1324	.0470	32.2
900	20.6	14.19	2.15	.0664	.0474	.0310	.1445	.0520	35.1
1000	22.4	15.26	2.26	.0687	.0521	.0335	.1565	.0560	38.0
1100	24.2	16.26	2.37	.0710	.0567	.0363	.1694	.0600	41.1

Figure 2. Two-year-old first-calf heifers in good body condition.

Possible Rations for 2 year old heifers (900 lb) Nursing a Calf (10 lb milk/day, ADG .75, Condition Score 3)

Ration 1 17.5 lb. legume hay (18% CP)
6.0 lb. corn grain (10.1% CP)

Ration 2 6.0 lb. legume hay (18% CP)
35.0 lb. corn silage (8% CP)
4.0 lb. corn grain (10.1% CP)

Ration 3 34.5 lb. legume haylage (18% CP)
6.0 lb. corn grain (10% CP)

Ration 4 14.5 lb. mixed hay (12.2% CP)
9.0 lb. corn grain (10.1% CP)

Prior to pasture, top quality forage must be fed with adequate supplementation of energy (grain) to ensure adequate continued growth, milk production and early conception. If feed supplies are not adequate to maintain heifers in good body condition, early weaning of the calf crop may be a consideration in preparing the pregnant second calf "heifer" for winter. These heifers still need preferential treatment in terms of nutrients for growth and gestation. They should be managed and fed separately from the mature cow herd.

Producers not willing to commit themselves to higher levels of nutrition and management for raising replacement heifers to calve as two-year-olds have the alternatives of calving heifers approaching three years of age or buying in replacement heifers and/or young cows. Each producer needs a system that works and optimizes production.

Successful management and feeding of replacement beef heifers is a real challenge for most cow-calf producers. Feeding to meet the nutritional requirements for growth, pregnancy, milk production and rebreeding is a major part of a total management program.

References (Available from the Author):

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